# MSC15-CS

https://www.gigahertz-optik.com/en-us/product/msc15-cs/

**Product tags: VIS** 



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#### **Description**

#### The circadian phototransduction process

Circadian phototransduction is the process that converts optical radiation incident on the retina into neuronal signals that reach the suprachiasmatic nucleus (SCN). The mechanism of circadian phototransduction can be viewed as a unique neuronal circuit in the retina with spectral sensitivity to optical radiation and a characteristic response to varying amounts of this optical radiation. Therefore, measurement of optical radiation and evaluation of it according to circadian effects is important.

According to Rea et al, modeling circadian phototransduction in humans requires a systematic and convergent approach to understand how a retinal circuit might perform this transformation.

Such a model was developed by the team and implemented in the MSC15-CS.



The MSC15-CS is a spectral-measuring luxmeter which, in addition to all the features of the established <u>MSC15 spectral light meter</u>, additionally contains the circadian assessments according to:

Modeling Circadian Phototransduction: Quantitative Predictions of Psychophysical Data. By Rea, M. S., Nagare, R., and Figueiro, M. G. (2021). Front. Neurosci. 15:615322. doi: 10.3389/fnins.2021.615322

and the correction:

Corrigendum: Modeling Circadian Phototransduction: Quantitative Predictions of Psychophysical Data. by Rea, M. S., Nagare, R., and Figueiro, M. G. (2021). Front. Neurosci. 15:615322. doi: 10.3389/fnins.2022.849800

# The MSC15-CS - Compact spectral measuring circadian meter.

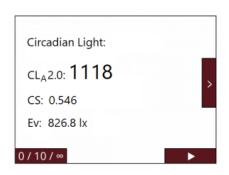
With the MSC15-CS Gigahertz-Optik GmbH has developed a spectral measuring light meter in the special version -CS which allows the circadian evaluation of light sources directly on site. The evaluated measurement results are displayed directly on the touch screen. A control by means of the supplied software and display of the measured values in this is also possible.

Technically, the instrument corresponds to the established MSC15 spectral light meter with its high accuracy, a spectral range from 360 nm to 830 nm, a low calibration uncertainty and accurate characterizations and corrections like non-linearity as well as bandwidth effects, etc.

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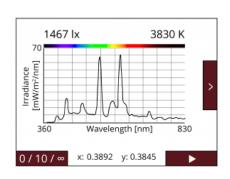
MSC15-CS for measurement of circadian stimulus, illuminance, spectrum and color



Circadian Display on MSC15-CS



Display of photopic lux, CCT and CRI Ra

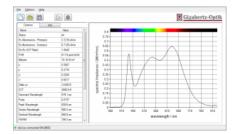


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Display of the spectral power distribution, photopic lux and CCT



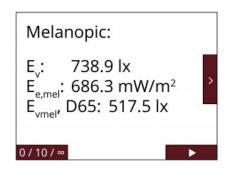
## Calibration of the MSC15-CS Circadian Light Meter

One essential quality feature of photometric devices is their precise and traceable calibration. The MSC15-CS is calibrated by Gigahertz-Optik's calibration laboratory that is accredited by DAkkS (D-K-15047-01-00) for the *spectral responsivity* and *spectral irradiance* according to ISO/IEC 17025. Every device is supplied with its respective calibration certificate.

Example measurement in the MSC15's software

#### Software possibilities

In addition to the free user software, the software development kit is also available for users to integrate the meter into their own software.



melanopic display

## **Specifications**

General			
Short description	Spectral circadian stimulus light meter		
Main features	Mobile light meter, spectroradiometer 360 nm to 830 nm with a 10 nm optical bandwidth and additional optical bandwidth correction (CIE214), precise cosine field of view function ( $f_2$ ), Lithium ion battery with over 8 operation hours and traceable calibration		
Measurement range	1 lx to 350,000 lx, 360 nm to 830 nm		
Typical applications	Precise spectral light meter for the lighting industry and all kind of applications		
Calibration	Factory calibration. Traceable to international calibration standards.		
Product			
MSC15	Handheld light meter for circadian stimulus, illuminance, spectral data and light color. Color-Touchscreen, simple intuitive Operation with clearly arranged display views. Storage of 10 measuring points and selection of different display views is possible. Extension of the MSC15.  (Class B according DIN 5032-7 or AA according to JIS C 1609-1:2006)		
Input optics	Diffuser window with 10mm diameter, cosine corrected field of view, f2 $\leq$ 3 %		

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Measured Quantity  Illuminance stotopic Illuminance				
Spectral Pradiance  (Rolar rendering index) PAR-PPD PA	Measured Quantity			
Color coordinates (x, y) CRI (color rendering index) RAR- PPED Metamopic in uninance (equivalent melanopic lux) Metamopic in uninance (equivalent melanopic lux) Metamopic in uninance (equivalent melanopic lux) Marage spectral indiuminance Total irradiance for bilinabin (Ebb) Average spectral irradiance for bilinabin (AAP) Other color quantities as well by software (x, y, u', v', X, Y, z, delta uv, color temperature, color rendering index (CRI) Ra, RI-1815, TM-30-20, CQS, CIE-170, etc.)  Spectral Detector  Spectral Potector  Spectral range  (360 - 830) nm  Optical Bandwidth  10 nm optical bandwidth correction applied according to CIE 214  Measurement range typ, white LED  CCT Measurement range (1700 - 17000) K  ACCT  ± 50 K (standard illuminant type A, k=2) ± 3 MKr' (standard illuminant type A, k=7) ± 44% (depending on the LEO spectrum, k=2)  Ay Ax uncertainty  ± 0.0002 (standard illuminant A, k=2)  Ay Ax uncertainty  ± 0.0002 (standard illuminant A, k=2)  Peak wavalength  ± 1 nm  Calibration  Calibration  Miscellaneous  Interface  USB 2.0  Temperature range  Operation: 10°C to +30°C  Storage: -10°C to +50°C  Power Supply  Power Supply  Power Supply  rechargeable battery  8h of operation (continuous measurement, standby modus, 100% display backlight to 10% (sufficient for				
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Spectral Detector  Spectral Potential and Wick (RN) Ra, R1.R15, TM-30-20, CQS, CIE-170, etc.)  Spectral range  (360 - 830) nm  Optical Bandwidth  10 nm optical bandwidth correction applied according to CIE 214  Measurement range typ. white LED  CCT Measurement range  (1700 - 17000) K  ACCT  250 K (standard illuminant type A, k=2)  23 MK* (Standard illuminant type A, k=1)  24 4% (depending on the LED spectrum, k=2)  Ay Δx uncertainty  20002  Peak wavelength  21 nm  Calibration  Calibration  Miscellaneous  Illuminance (standard illuminant A, k=2) +/- 3% Illuminance (typ. LED, k=2) +/- 4% (Traceable to notional standard. Uncertainty of the standard is included.)  Miscellaneous  Temperature range  Operation: 10°C to +30°C Storage: -10°C to +50°C  Power Supply  Power Supply  Rechargeable battery  8h of operation (continuous measurement, standy modus, reduced display backlight on) 31.5h of operation (continuous measurement, standy modus, reduced display backlight on) 30 no of operation (continuous measurement, standy modus, reduced display backlight on) 30 no of operation (continuous measurement, standy modus, reduced display backlight to 10% (sufficient for		Total irradiance for bilirubin (Ebi)		
Spectral range  (360 - 830) nm  Optical Bandwidth  10 nm optical bandwidth correction applied according to CIE 214  Measurement range typ. white LED  CCT Measurement range  (1700 - 17000) K  ACCT  ± 50 K (standard illuminant type A, k=2) ± 3 MK* (Standard illuminant type A, k=2) ± 3 MK* (Standard illuminant type A, k=1) ± 4% (depending on the LED spectrum, k=2)  Ay Δx uncertainty  ± 0.002 (Standard illuminant A, k=2)  Repeatability  ± 0.0002  Peak wavelength  ± 1 nm  Calibration  Calibration  Calibration  Miscellaneous  Interface  USB 2.0  Temperature range  Operation: 10°C to +30°C Storage: -10°C to +50°C  Power Supply  Power Supply  rechargeable battery  8h of operation (one measurement, 100% display backlight on) 13.5h of operation (one measurement, standby-modus, reduced display backlight to for fore the standard display backlight to fore fore the standard display backlight on fore fore the standard display fore the standard display fore the standard display fore the stan		Other color quantities as well by software (x, y, u´, v´, X,Y,Z, delta uv, color temperature, color rendering		
Optical Bandwidth 10 nm optical bandwidth correction applied according to CIE 214  Measurement range typ. white LED  CCT Measurement range (1700 - 17000) K  CCT Measurement range (1700 - 17000) K  ACCT \$ 150 K (standard illuminant type A, k=2) \$ 2 3 MK* (Standard illuminant type A, k=1) \$ 1 4% (depending on the LED spectrum, k=2)  Ay Ax uncertainty \$ 0.0002 (Standard illuminant A, k=2)  Repeatability \$ 0.0002  Peak wavelength \$ 1 nm  Calibration  Calibration  Calibration uncertainty   Illuminance (standard illuminant A, k=2) +/- 3%   Illuminance (typ. LED, k=2) +/- 4%   (Traceable to national standard. Uncertainty of the standard is included.)  Miscellaneous  Interface USB 2.0  Temperature range   Operation: 10°C to +30°C   Storage: -10°C to +50°C  Power Supply   SVDC by USB  Power Supply   Power Supply   SVDC by USB  Power Supply   P	Spectral Detector			
Age assurement range typ. white LED       (1 - 350000) k         CCT Measurement range       (1700 - 17000) K         ΔCCT       ± 50 K (standard illuminant type A, k=2)         ± 3 MK¹ (Standard illuminant type A, k=1)       ± 4% (depending on the LED spectrum, k=2)         Δy Δx uncertainty       ± 0.0002 (Standard illuminant A, k=2)         Repeatability       ± 0.0002         Peak wavelength       ± 1 nm         Calibration       Illuminance (standard illuminant A, k=2) +/- 3%         Illuminance (typ. LED, k=2) +/- 4%       (Traceable to notional standard. Uncertainty of the standard is included.)         Miscellaneous       USB 2.0         Temperature range       Operation: 10°C to +30°C         Storage: -10°C to +50°C       Storage: -10°C to +50°C         Power Supply       5VDC by USB         Power Supply       rechargeable battery         8 of operation (continuos measurement, 100% display backlight on)       13.5h of operation (one measurement, standby-modus, reduced display backlight to 10% (sufficient for	Spectral range	(360 - 830) nm		
Measurement range typ. white LED       (1 - 350000) k         CCT Measurement range       (1700 - 17000) K         ΔCCT       ± 50 K (standard illuminant type A, k=2)         ± 3 MK¹ (Standard illuminant type A, k=1)       ± 3 MK¹ (Standard illuminant type A, k=1)         ± 4% (depending on the LED spectrum, k=2)       Δy Δx uncertainty         Repeatability       ± 0.0002         Peak wavelength       ± 1 nm         Calibration       Calibration uncertainty       Illuminance (standard illuminant A, k=2) +/- 3%         Illuminance (typ. LED, k=2) +/- 4%       (Traceable to national standard. Uncertainty of the standard is included.)         Miscellaneous       Interface       USB 2.0         Temperature range       Operation: 10°C to +30°C         Storage: -10°C to +50°C       Storage: -10°C to +50°C         Power Supply       5VDC by USB         Power Supply       rechargeable battery         8h of operation (continuos measurement, 100% display backlight on)         13.5h of operation (one measurement, standby-modus, reduced display backlight to 10% (sufficient for	Optical Bandwidth	10 nm		
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ΔCCT  ± 50 K (standard illuminant type A, k=2)  ± 3 MK (depending on the LED spectrum, k=2)  Δy Δx uncertainty  ± 0.0002 (Standard illuminant A, k=2)  Repeatability  ± 0.0002  Repeat wavelength  ± 1 nm  Calibration  Calibration  Calibration  Calibration  Calibration  Uncertainty  Illuminance (standard illuminant A, k=2) +/- 3%  Illuminance (typ. LED, k=2) +/- 4%  (Traceable to national standard. Uncertainty of the standard is included.)  Miscellaneous  Interface  USB 2.0  Temperature range  Operation: 10°C to +30°C  Storage: -10°C to +50°C  Power Supply  Power Supply  Power Supply  Power Supply  13.5h of operation (continuos measurement, 100% display backlight on)  13.5h of operation (one measurement, standby-modus, reduced display backlight to 10% (sufficient for		(1 - 350000) lx		
± 3 MK <sup>1</sup> (Standard illuminant type A, k=1)  ± 4% (depending on the LED spectrum, k=2)  Δy Δx uncertainty  ± 0.002 (Standard illuminant A, k=2)  Repeatability  ± 0.0002  Peak wavelength  ± 1 nm  Calibration  Calibration uncertainty  Illuminance (standard illuminant A, k=2) +/- 3%  Illuminance (typ. LED, k=2) +/- 4%  (Traceable to national standard. Uncertainty of the standard is included.)  Miscellaneous  Interface  USB 2.0  Temperature range  Operation: 10°C to +30°C  Storage: -10°C to +50°C  Power Supply  Power Supply  Power Supply  Rh of operation (continuos measurement, 100% display backlight on)  13.5h of operation (one measurement, standby-modus, reduced display backlight to 10% (sufficient for	CCT Measurement range	(1700 - 17000) K		
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Ay Δx uncertainty ± 0.002 (Standard illuminant A, k=2)  Repeatability ± 0.0002  Peak wavelength ± 1 nm  Calibration  Calibration uncertainty Illuminance (standard illuminant A, k=2) +/- 3%		$\pm$ 3 MK <sup>-1</sup> (Standard illuminant type A, $k=1$ )		
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Peak wavelength ± 1 nm  Calibration  Calibration uncertainty Illuminance (standard illuminant A, k=2) +/- 3% Illuminance (typ. LED, k=2) +/- 4% (Traceable to national standard. Uncertainty of the standard is included.)  Miscellaneous  Interface USB 2.0  Temperature range Operation: 10°C to +30°C Storage: -10°C to +50°C  Power Supply 5VDC by USB  Power Supply rechargeable battery 8h of operation (continuos measurement, 100% display backlight on) 13.5h of operation (one measurement, standby-modus, reduced display backlight to 10% (sufficient for	Δy Δx uncertainty	± 0.002 (Standard illuminant A, <i>k=2</i> )		
Calibration  Calibration uncertainty  Illuminance (standard illuminant A, k=2) +/- 3%  Illuminance (typ. LED, k=2) +/- 4%  (Traceable to national standard. Uncertainty of the standard is included.)  Miscellaneous  Interface  USB 2.0  Temperature range  Operation: 10°C to +30°C  Storage: -10°C to +50°C  Power Supply  Power Supply  rechargeable battery  8h of operation (continuos measurement, 100% display backlight on)  13.5h of operation (one measurement, standby-modus, reduced display backlight to 10% (sufficient for	Repeatability	± 0.0002		
Calibration uncertainty  Illuminance (standard illuminant A, k=2) +/- 3% Illuminance (typ. LED, k=2) +/- 4% (Traceable to national standard. Uncertainty of the standard is included.)  Miscellaneous  Interface  USB 2.0  Temperature range  Operation: 10°C to +30°C Storage: -10°C to +50°C  Power Supply  Power Supply  rechargeable battery 8h of operation (continuos measurement, 100% display backlight on) 13.5h of operation (one measurement, standy modus, 100% display backlight to 10% (sufficient for	Peak wavelength	± 1 nm		
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Miscellaneous  Interface USB 2.0  Temperature range Operation: 10°C to +30°C  Storage: -10°C to +50°C  Power Supply 5VDC by USB  Power Supply rechargeable battery  8h of operation (continuos measurement, 100% display backlight on)  13.5h of operation (one measurement, standy modus, 100% display backlight to 10% (sufficient for		Illuminance (typ. LED, <i>k</i> =2) +/- 4%		
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13.5h of operation (one measurement, standy modus, 100% display backlight on)  30h of operation (one measurement, standby-modus, reduced display backlight to 10% (sufficient for	Power Supply	rechargeable battery		
30h of operation (one measurement, standby-modus, reduced display backlight to 10% (sufficient for		8h of operation (continuos measurement, 100% display backlight on)		
		13.5h of operation (one measurement, standy modus, 100% display backlight on)		

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Display	Color Touchscreen
Weight	160 g
Dimensions	136 mm x 74 mm x 32 mm

## **Downloads**

Туре	Description	File-Type	Download
MSC15 Technical Datasheet	MSC15 brochure	pdf	https://www.gigahertz-optik.com /assets/Uploads/Technical-Datas heet-MSC15-210x297-EN- sheets.pdf
Brochure	Light measurement solutions for general and specialized lighting	pdf	https://www.gigahertz-optik.com /assets/Uploads-v2/generallighti ng-broschuere-DINA4-hoch- v2.pdf

## **Purchasing information**

Article-Nr	Modell	Description
Product		
15316864	MSC15-CS	MSC15-CS spectral circadian stimulus light meter measurement device, USB cable, case for device and USB cable, S-MSC15 software as a download, calibration, Factory calibration certificate
15310290	KP-MSC15-E-S	Option: DIN EN ISO/IEC 17025:2018 Test Certificate (DAkkS)  Spectral irradiance measurement in wavelength range from 360nm to 830nm.
Re-calibration		
15300569	K-MSC15-I	Calibration of the MSC15 including wavelength adjustment. Factory calibration certificate
15310249	KKP-MSC15-E-S	Factory Calibration Certificate with DIN EN ISO/IEC 17025:2018 Test Certificate.
Software		
15306347	S-SDK-MSC15	Software development kit

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### **Contact, Calibration, Service & Support**

We are known worldwide for excellent technical consulting and after sales support. Contact us to find together the best solution for you. Our services:

- Technical Consulting & Sales
- After-Sales Support
- Calibrations & Re-Calibrations (<u>ISO/IEC 17025 Calibration Services, factory calibration</u>, <u>Calibration of Third-Party Products</u>)
- Repairs & Updates
- OEM & Feasibility Consulting of Customized Solutions

<u>Send us your inquiry</u> or contact us by phone or e-mail. We would welcome your feedback too or review us on <u>Google</u>.

### **Gigahertz Optik GmbH (Headquarter)**

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